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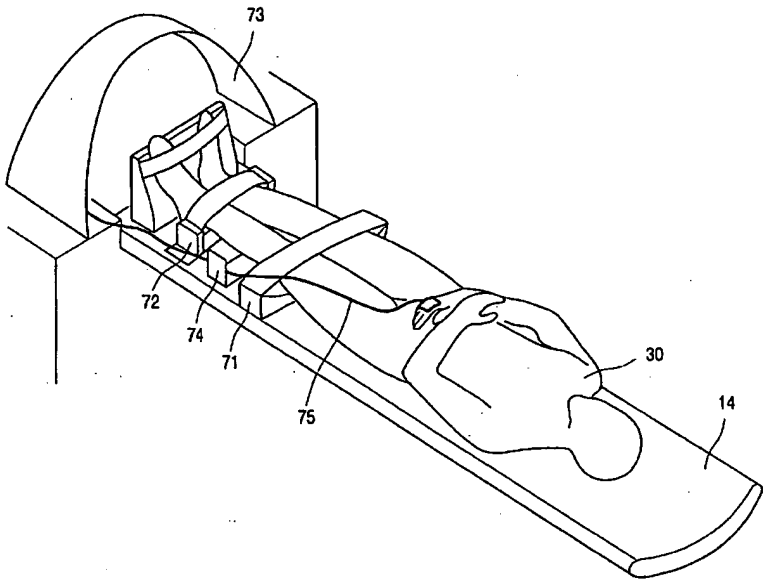
(54) Title: STEPPING-TABLE MRA



(57) Abstract: A magnetic resonance imaging method comprises the acquisition of data sets of magnetic resonance signals from respective scan-volumes of the object. The acquisition of the data sets is started on the basis of a regulation signal. An explorative scan is employed to obtain the regulation signal. Preferably, a fluoroscopic scan of a thick slice is used to decide the appropriate moment for starting the acquisition of data sets. This acquisition can be started manually while viewing the fluoroscopic MR-image of the thick slice. Alternatively, the acquisition of the data sets can be started automatically on the basis of a comparison of the regulation signal with a preselected reference.

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STEPPING-TABLE MRA

The invention relates to a magnetic resonance imaging method comprising the acquisition of data sets of magnetic resonance signals from respective scan-volumes of an object.

Such a magnetic resonance imaging method and a corresponding magnetic resonance imaging system are known from the US-patent **US 5 928 148.**

The known magnetic resonance imaging method pertains in particular to MR-angiography which forms magnetic resonance images of a patient's bloodvessel system. In order to improve contrast of notably the patient's arteries, a contrast agent is administered. According to the known magnetic resonance imaging method, magnetic resonance signals are acquired from a large region of interest by translating the patient to successive stations at which the respective sets of magnetic resonance signals are picked up. To this end the receiver system of the known magnetic resonance imaging system comprises a stationary local receiver coil which is supported adjacent the patient so as to acquire the magnetic resonance signals. In another embodiment of the known magnetic resonance imaging system the receiver system comprises a multi-segment local coil which is moveable with the patient and its coil segments are sequentially switched into operation. At the successive stations, respective parts of the patient to be examined are moved into the field-of-view of the magnetic resonance imaging system. The respective scan-volumes are defined by the respective parts of the patient wherefrom the respective coil segments acquire magnetic resonance signals at the successive stations. According to the known magnetic resonance imaging method, the respective scan-volumes are aligned so that the sets of magnetic resonance signals can be concatenated in order to form a single MR-image of the entire region of interest.

In MR-angiography the contrast agent is injected into one of the patient's veins and subsequently reaches the patient is heart from wherefrom it is fed as a contrast bolus into the patient's arterial system. In order to image the patient's arterial system while it is adequately filled with the contrast agent, the known method employs a separate 'timing'

scan which measures the velocity of the contrast bolus. The time which elapses between the injection of the contrast bolus into the vein until the arrival of the contrast bolus in the artery at issue is estimated from the measured velocity. The movement of the patient between the successive stations is controlled on the basis of this estimated time-lapse.

An object of the invention is to provide an magnetic resonance imaging method enabling easier acquisition of magnetic resonance signals in concert with administering the contrast agent. It is also an object of the invention to provide a magnetic resonance imaging method which produces magnetic resonance images of high diagnostic quality of a patient's arterial vascular system.

This object is achieved by the magnetic resonance imaging method, according to the invention comprising the steps of

- employing an explorative scan so as to acquire explorative magnetic resonance signals from an object
- generate a regulation signal on the basis of the explorative scan,
- acquiring data sets of magnetic resonance signals from respective scan-volumes of the object, wherein
- the acquisition of the data sets is started on the basis of the regulation signal.

According to the invention, first the explorative magnetic resonance scan is performed. From the magnetic resonance signals picked-up in the explorative magnetic resonance scan the occurrence of the contrast agent is detected; this takes place after the contrast agent has been injected in a vein of the patient to be examined. For example, the explorative magnetic resonance scan forms a fluoroscopic magnetic resonance image of a comparatively thick slice and with a large field of view. The regulation signal is formed on the basis of the detected contrast. The acquisition of the data sets is started on the basis of the regulation signal. For example, the contrast can be detected by the operator who then manually generates the regulation signal, e.g. by pushing a button or by issuing a software command to the magnetic resonance imaging system. The operator may employ various properties of the contrast to decide on generating the regulation signal for starting the acquisition of the data sets. The operator may decide in particular on the basis of the strength

of contrast, the onset of contrast in a particular region or the rate of increase of contrast. Such contrast properties are represented in the magnetic resonance signals from the explorative scan. The onset of the contrast is derived from the fluoroscopic magnetic resonance image; for example, the arrival of contrast in the patient's abdominal aorta and/or in the iliac bifurcation is detected. To this end, an explorative magnetic resonance image is reconstructed from the magnetic resonance signals from the explorative scan. This explorative magnetic resonance image is displayed to the operator.

The acquisition of the data sets may also be started automatically. To that end, the regulation signal is derived from the explorative scan such that the signal level of the regulation signal represents the temporal variations of the contrast in the object. This regulation signal may be derived from the magnetic resonance signals from the explorative scan or from a reconstructed explorative magnetic resonance image such as the fluoroscopic magnetic resonance image. The automatic start of the acquisition of the data sets usually takes place on the basis of a comparison of the regulation signal with a preselected reference.

The preselected reference represents the onset of contrast upon injection of the contrast agent. The preselected reference may be set by the operator prior to individual MR-examinations or may have a standard value. Optimum values for the preselected contrast may be obtained empirically, for instance from studies on healthy volunteers.

When the comparison of the regulation signal and the preselected contrast reveals that the contrast is sufficient, the explorative scan is aborted and the acquisition of data sets of magnetic resonance signals is started. The data sets involve notably magnetic resonance signals that relate to a three-dimensional volume of the patient to be examined. For example, magnetic resonance signals are acquired from one or several scan-volumes and the magnetic resonance signals pertain to a number of comparatively thin slices in the scan-volumes. Furthermore, the data sets of magnetic resonance signals are preferably acquired by scanning k-space according to strategies which avoid venous enhancement in the data sets of magnetic resonance signals. For example, k-space is scanned linearly in time through the center of k-space, or k-space is scanned from the center of k-space to the periphery of k-space.

From the data sets of magnetic resonance signals there are reconstructed one or several magnetic resonance images of the patient to be examined; these images show the patient's arterial system with a high spatial resolution and small details of little contrast are rendered well visible therein.

It is advantageous to switch over from the explorative scan to the acquisition automatically. Thus, this switch does not require attention of the person operating the magnetic resonance imaging system. Hence, the person operating the magnetic resonance imaging system may direct his attention more fully to the patient to be examined. Moreover, the timing of the start of the acquisition of the data sets is more accurate as compared to manual switching over from the explorative scan to the acquisition of data sets.

These and other aspects of the invention will be further elaborated in relation to the preferred implementations and preferred embodiments as defined in the dependent Claims.

Preferably, a set of mask sets of magnetic resonance signals is acquired before the contrast agent is administered. The individual mask sets relate to separate spatial scan-volumes of the patient to be examined. In order to acquire these separate mask sets, the patient is moved between successive stations and at each station the scan-volume at issue is situated at the iso-center of the magnetic resonance imaging system. According to the invention, the acquisition of the mask sets involves moving the patient along the successive stations in the mask order. Similarly, in order to acquire these separate data sets the patient is moved between successive stations and at each station the scan-volume at issue is situated at the iso-center of the magnetic resonance imaging system. According to the invention, the acquisition of the mask sets involves moving to patient along the successive stations in the data order. The data order and the mask order have opposite directions so that the patient to be examined is only moved back and forth just once and no movement of the patient occurs between stations without acquisition of magnetic resonance signals at said stations. Hence, motion-sickness of the patient is avoided and the procedure of positioning the patient from one station to the next for the acquisition of mask sets and data sets is not very cumbersome. Preferably, the mask sets are acquired in the order from the patient's feet to the patient's abdomen and the data sets are then acquired from the patient's abdomen back to the patient's feet. In this way the patient is placed first with the abdomen at about the iso-center of the magnetic resonance imaging system, so that scanning of the abdominal region is started after the explorative scan signals sufficient contrast. The patient's abdominal region is at the iso-center of the magnetic resonance imaging system when sufficient contrast is signalled and no additional movement of the patient is required.

Advantageously, the mask sets and data sets are used to compare any changes which have occurred in the time elapsed between the acquisition of the mask sets, which are then employed as a reference, and the acquisition of the data sets. Preferably, the contrast

agent is administered between the acquisition of the mask sets and the data sets. Mask magnetic resonance images are reconstructed from individual mask sets. Contrast magnetic resonance images are reconstructed from individual data sets. Difference magnetic resonance images are formed by subtracting the mask magnetic resonance images from the corresponding contrast magnetic resonance images relating to the respective stations. These difference images represent mainly the patient's vascular system and above all the patient's arterial system.

The mask sets may also be acquired after the acquisition of the data sets. According to this option, the acquisition of the mask sets should be started only after the contrast agent, which may have been employed in the acquisition of the data sets, has left the region to be imaged.

It is to be noted that the feature of the opposite data order and mask order may be advantageously employed independently from the explorative scan for generating the regulation signal. On the other hand, the explorative scan and the opposite data order and mask order are technically related in that both aim at realizing efficient movement of the patient to be examined between the various stations. Both features notably contribute to data sets of the respective scan-volumes being acquired, corresponding to the presence or arrival of contrast agent in the scan-volume at issue.

The invention also pertains to a magnetic resonance imaging system. Generally speaking, in order to generate and acquire magnetic resonance signals a number of settings of the magnetic resonance imaging system need to be determined. Such settings are determined in particular while the patient is placed in the examination zone of the magnetic resonance imaging system. The settings of the magnetic resonance imaging system can thus be accurately adapted to the actual patient to be examined. Examples of such settings are the tuning and matching of the RF coils to the patient to be examined, RF power optimization, determination of the precise Larmor frequency, i.e. the central carrier frequency (f_0) of the modulated magnetic resonance signals, automatic shimming, receiver optimiation, receiver correction and/or echo phase determination. Preferably, respective sets of settings are realized for the individual scan-volumes, i.e. for the individual stations. According to the invention these settings are realized in a preparation sequence before the mask sets are acquired, the explorative scan is performed and the data sets are acquired. It appears that the settings obtained from the preparation sequence are also suitable for the accurate acquisition of mask sets and data sets and for the explorative scan. Superfluous re-iteration of the preparation sequences so as to achieve the settings is thus avoided. Hence, the magnetic

resonance imaging system according to the invention needs only a comparatively short time for performing the signal generation and acquisition.

Preferably, the magnetic resonance imaging system is fitted with a patient carrier, for example a patient table, on which the patient is placed in the examination zone of the magnetic resonance imaging system. The examination zone is the region in the magnetic resonance imaging system wherein magnetic resonance signals can be generated when an object is placed therein and wherefrom the magnetic resonance signals can be acquired. The magnetic resonance signals are generated, for example by an RF excitation coil. The magnetic resonance signals are picked up by RF antennae, such as RF coils. Often, a so-called synergy coil is used both for excitation and acquisition of magnetic resonance signals. During magnetic resonance signal generation and/or acquisition temporary magnetic gradients are usually applied by activation of gradient coils. The examination zone is formed by the region which is accessible to excitation by the RF-excitation coil and in which the RF antennae have a substantial sensitivity to magnetic resonance signals. According to the invention, the patient table is provided with several trestles. Such trestles are used to locally support the patient's legs such that the muscles of the patient's legs remain substantially freely suspended. This is achieved in particular by supporting the patient's hollows of the knees with a first trestle and supporting the patient's ankles with a second trestle. Thus it is achieved that the patient's legs remain solidly immobilized while the muscles of notably the calves and the thighs remain freely suspended. It appears that the free suspension of the muscles avoids perturbation of the blood flow, notably the transition of blood from the arteries to the veins through the capillary vessel system. Consequently, the arrival of blood with contrast agent in the veins is delayed and venous enhancement in the magnetic resonance signals of the data sets is avoided. The trestles may be formed as actual trestles, such as those having divergent legs carrying a transverse bar, but other shapes may also be used, for example, a firm elongate cushion. Advantageously, the transverse bar has a convex top side and has a width of about from 10 to15cm. Such a convex shaped comparatively wide transverse bar supports the patient's legs without pinching-off the blood vessels. Venous enhancement is thus delayed while comfort is achieved for the patient to be examined.

Often cables and/or tubes are moved into the examination zone together with the patient as the patient carrier is shifted into the examination zone. These cables and/or tubes can be supported by a stay having an L-shaped cross section. Thus, the stay has two, for example planar arms which extend at an angle. Preferably, the arms enclose an angle in the range of from 50° to 130°; the arms preferably extend about perpendicularly to one another.

One arm of the stay is placed underneath the patient to be examined so that the stay is well fixed and the other arm extends transversely of the table top supporting the patient and stems the cables and tubes should they tend to drop down on the patient to be examined.

Cables and/or tubes can alternatively be supported by a longitudinal rod which is fixed to the table next to the patient and has fixation points to strap the cables and/or tubes.

The cables and/or tubes are thus simply prevented from becoming jammed between the patient table and the gantry of the magnetic resonance imaging system enveloping the examination zone.

Another preferred embodiment of the magnetic resonance imaging system of the invention is provided with a surveyor unit for measuring the position of the patient carrier at the respective scan positions which correspond, for example, to the scan-volumes or stations. Such a surveyor unit is, for example, implemented as an electric potentiometer system which provides an electric position signal. The position measured at the station at issue is compared with a reference value by means of a comparator. The reference position is stored in a memory, for example in the working memory of the control system of the magnetic resonance imaging system. This memory and the surveyor are coupled to input ports of the comparator and the output of the comparator supplies a deviation signal which represents the deviation between the measured position and the reference position. The reference position notably represents an intended position for the station at issue, i.e. the intended location for the scan-volume at issue. Hence, the comparator compares the actual position of the patient carrier with the intended position. The comparator applies the deviation signal to the control system of the magnetic resonance imaging system. On the basis of the deviation signal the control system adjusts the temporary magnetic gradient fields and/or the RF-excitation in order to adjust the effective scan-volume so that the effective scan-volume accurately corresponds to the reference position. It is also possible the correct for any deviation between the reference position and the actual position of the patient carrier by adapting the reconstruction of the magnetic resonance image from the magnetic resonance signals. This avoids the necessity of an additional fine adjustment of the positioning of the patient carrier which would be cumbersome, time-consuming and comparatively inaccurate. It appears that correcting the positioning of the scan-volume by adjusting the magnetic gradient fields and/or by adjusting the spatial encoding in the reconstruction is substantially more accurate and requires hardly any time.

Preferably, the position of the patient carrier for a scan-volume in which a mask set of magnetic resonance signals is acquired is employed as the reference position of

the patient carrier for the corresponding scan-volume for the data set. Thus, it is achieved that the mask magnetic resonance image corresponds accurately to the contrast magnetic resonance image at the corresponding scan-volume and that artefacts due to deviations in the position of the patient carrier upon the acquisition of the mask sets and data sets are avoided. Hence, the diagnostic quality of the ensuing subtraction image is significantly improved.

It is to be noted that the feature of sharing the settings from the preparation sequence and the feature of measuring the position of the patient carrier which is then compared with a reference position may be employed independently. On the other hand, these features are technically related in that both aim to achieve accurate and fast adjustment of the magnetic resonance imaging system in order to produce magnetic resonance images of high diagnostic quality.

The magnetic resonance imaging system of the invention is suitable for carrying out the magnetic resonance imaging method of the invention. This is achieved in practice by suitably programming a computer or micro-processor which controls the magnetic resonance imaging system. This micro-processor is, for example, included in the control system of the magnetic resonance imaging system.

The invention also relates to a computer program as defined in the independent Claim 11. The computer program according to the invention enables the magnetic resonance imaging system to achieve the technical effects involved in performing the magnetic resonance imaging method of the invention. The computer program is loaded into the computer or micro-processor of the magnetic resonance imaging system.

These and other aspects of the invention will be elucidated with reference to the embodiments described hereinafter and with reference to the accompanying drawing wherein

Figure 1 shows diagrammatically a magnetic resonance imaging system in which the invention is used and

Figure 2 is a schematical perspective view of the patient carrier and the gantry of the magnetic resonance imaging system as used according to the invention.

Figure 1 shows diagrammatically a magnetic resonance imaging system in which the invention is used. The magnetic resonance imaging system includes a set of main

coils 10 whereby a steady, uniform magnetic field is generated. The main coils are constructed, for example in such a manner that they enclose a tunnel-shaped examination space. The patient to be examined is slid into this tunnel-shaped examination space. The magnetic resonance imaging system also includes a number of gradient coils 11, 12 whereby magnetic fields exhibiting spatial variations, notably in the form of temporary gradients in individual directions, are generated so as to be superposed on the uniform magnetic field. The gradient coils 11, 12 are connected to a controllable power supply unit 21. The gradient coils 11, 12 are energized by application of an electric current by means of the power supply unit 21. The strength, the direction and the duration of the gradients are controlled by control of the power supply unit. The magnetic resonance imaging system also includes transmission and receiving coils 13 for generating RF excitation pulses and for picking up magnetic resonance signals, respectively. The transmission coil 13 is preferably constructed as a body coil 13 whereby (a part of) the object to be examined can be enclosed. The body coil is usually arranged in the magnetic resonance imaging system in such a manner that the patient 30 to be examined is enclosed by the body coil 13 when he or she is arranged in the magnetic resonance imaging system. The body coil 13 acts as a transmission antenna for the transmission of the RF excitation pulses and RF refocusing pulses. Preferably, the body coil 13 involves a spatially uniform intensity distribution of the transmitted RF pulses (RFS). The same coil or antenna is usually used alternately as the transmission coil and the receiving coil. Such a coil is usually indicated as a 'synergy coil'. Furthermore, the transmission and receiving coil is usually shaped as a coil, but other geometries where the transmission and receiving coil acts as a transmission and receiving antenna for RF electromagnetic signals are also feasible. The transmission and receiving coil 13 is connected to an electronic transmission and receiving circuit 15.

It is to be noted that it is alternatively possible to use separate receiving coils. For example, surface coils can be used as receiving coils. Such surface coils have a high sensitivity in a comparatively small volume. The transmission coils, such as the surface coils, are connected to a demodulator 24 and the received magnetic resonance signals (MS) are demodulated by means of the demodulator 24. The demodulated magnetic resonance signals (DMS) are applied to a reconstruction unit. The receiving coil is connected to a preamplifier 23. The preamplifier 23 amplifies the RF resonance signal (MS) received by the receiving coil and the amplified RF resonance signal is applied to a demodulator 24. The demodulator 24 demodulates the amplified RF resonance signal. The demodulated resonance signal contains the actual information concerning the local spin densities in the part of the

object to be imaged. Furthermore, the transmission and receiving circuit 15 is connected to a modulator 22. The modulator 22 and the transmission and receiving circuit 15 activate the transmission coil 13 so as to transmit the RF excitation and refocusing pulses. The reconstruction unit derives one or more image signals from the demodulated magnetic resonance signals (DMS), which image signals represent the image information of the imaged part of the object to be examined. In practice the reconstruction unit 25 is constructed preferably as a digital image processing unit 25 which is programmed so as to derive from the demodulated magnetic resonance signals the image signals which represent the image information of the part of the object to be imaged. The signal on the output of the reconstruction unit is applied to a monitor 26, so that the monitor can display the magnetic resonance image. It is alternatively possible to store the signal from the reconstruction unit 25 in a buffer unit 27 while awaiting further processing.

According to the invention, the patient table 14 with the patient is moved to successive stations and at each station, as indicated by the arrow 40 In practice at the first station the abdominal region of the patient is scanned while at the second station the upper legs of the patient are scanned and at the third station the lower legs of the patient are scanned. At each station the magnetic resonance signals from the scan-volume at issue are acquired and magnetic resonance images are reconstructed.. The scan-volumes are indicated by the reference numerals 41,42 and 43. The patient shown positioned at the first stations in which the first scan-volume of the abdominal region is situated such that the iso-center IC of the magnetic resonance imaging system is located in the first scan-volume 43. Subsequently, the patient table 14 with the patient is moved so that the second scan-volume 42 and the third scan-volume 43 are placed at the iso-center IC. As is indicated schematically in Figure 1, the magnetic gradient fields are adjusted at each station in order that the *field-of-view* matches the local size of the patient at the respective stations.

The magnetic resonance images may be actual two-dimensional images, but also three-dimensional volumes may be reconstructed for the individual scan-volumes. The reconstruction unit 25 is preferably also arranged to combine the reconstructed images or volumes into an overview image or an overview volume which represents the patient's vascular system in the lower extremities. Such an overview shows notably the arterial system with a high diagnostic quality and a high spatial resolution.

The magnetic resonance imaging system according to the invention is also provided with a control unit 20, for example in the form of a computer which includes a (micro)processor. The control unit 20 controls the execution of the RF excitations and the

application of the temporary gradient fields. To this end, the computer program according to the invention is loaded, for example, into the control unit 20 and the reconstruction unit 25.

When the control unit 20 commands the magnetic resonance imaging system to perform the preparation sequence, the patient being placed in the examination zone 50 the gradient coils 12 and the RF-antennae 13 are controlled to perform the preparatory sequence of temporary gradient fields and RF excitations. This preparatory sequence is for example a comparatively simple magnetic resonance signal acquisition sequence. The explorative scan involves this preparatory sequence and the regulation signal is formed on the basis of the information collected by the preparatory sequence. For example, the explorative magnetic resonance image is reconstructed for the magnetic resonance signals acquired in the preparatory sequence by the reconstructive unit 25 and is shown on the monitor 26. Then the operator can apply the regulative signal, e.g. by pushing a button, to the control unit 20. Alternatively, the control unit can be arranged to analyze the explorature image and automatically generate the regulation signal to start the acquisition of the data sets. The demodulator 24 delivers an ensuing preparatory demodulated signal (p-DMS) which is applied to the control unit so as to obtain the settings that are appropriate for the relevant patient to be examined.

Furthermore, the surveyor unit 60, being provided with an electric position detector, for example an electric potentiometer arrangement, measures the position of the patient carrier 14. The surveyor unit applies an electric position signal (POS), representing the position of the patient carrier, to the comparator 61. The comparator compares the position signal (POS) with a reference signal (RFS) stored in a memory 62. The difference between the position signal and the reference signal is computed by the comparator and the comparator applies the deviation signal, representing the difference between the position signal and the reference signal, to the adjustment input of the control unit. On the basis of the deviation signal the control unit adapts the current effective scan-volume by activation of the gradient coils 12 so as to bring the current effective scan-volume into correspondence with the reference position. The control unit also adjusts the reconstruction unit 25 so as the bring the current reconstructed magnetic resonance image into correspondence with the reference position. Preferably, a previously measured position of the patient carrier is used as the reference position, so that the current scan-volume and magnetic resonance image are brought into correspondence with a previous scan-volume and magnetic resonance image.

Figure 2 is a schematic perspective view of the patient carrier 14 and the gantry 73 of the magnetic resonance imaging system as used according to the invention.

Figure 2 shows in particular that the patient's legs are supported by the first trestle 71 at the hollow of the knees and by the second trestle 72 at the ankles. The second trestle is also fitted with the approximately L-shaped stay 74 which supports any cable 75 or tubes that may be used during examination of the patient 30.

CLAIMS:

1. A magnetic resonance imaging method comprising the steps of
- employing an explorative scan so as to acquire explorative magnetic resonance signals from an object
- generate a regulation signal on the basis of the explorative scan,
- acquiring of data sets of magnetic resonance signals from respective scan-volumes of the object, wherein
- the acquisition of the data sets is started on the basis of the regulation signal.

2. A magnetic resonance imaging method as claimed in Claim 1, wherein
- the regulation signal represents temporal variations of contrast in the object and
- the acquisition of the data sets is started on the basis of a comparison of the regulation signal with a preselected reference.

3. A magnetic resonance imaging method as claimed in Claim 1, comprising
- acquisition of mask sets of magnetic resonance signals from respective scan-volumes of an object in a predetermined mask order,
- employing said explorative scan so as to acquire said explorative magnetic resonance signals from the object,
- acquisition of data sets of magnetic resonance signals from respective scan-volumes of the object in a predetermined data order,
- the data order being the opposite of the mask order.

4. A magnetic resonance imaging method as claimed in Claim 3, wherein
- the acquisition of the mask sets of magnetic resonance signals is carried out before administering a contrast agent to the object,
- the explorative scan and the acquisition of the data sets is carried out after the administering of the contrast agent.

5. A magnetic resonance imaging system which is arranged to

- perform a preparation sequence in which one or more settings of the magnetic resonance imaging system are determined, said settings relating in particular to respective scan-volumes, and
- perform acquisition of mask sets of magnetic resonance signals from respective scan-volumes of an object in a predetermined mask order,
- employ an explorative scan to acquire said explorative magnetic resonance signals from the object,
- acquisition of data sets of magnetic resonance signals from respective scan-volumes of the object in a predetermined data order,
- start the acquisition of the data sets on the basis of the regulation signal:
  - the data order being the opposite of the mask order and
  - the acquisition of mask sets, the explorative scan and the acquisition of the data sets being carried out using the settings from the preparation sequence.

6. A magnetic resonance imaging system having a patient carrier,
- wherein the patient carrier is provided with a support system comprising several trestles.

7. A magnetic resonance imaging system as claimed in Claim 6, comprising a stay with an approximately L-shaped cross-section.

8. A magnetic resonance imaging system, in particular as claimed in Claim 5, comprising
- a control system for controlling the magnetic resonance imaging system,
  - the control system having an adjustment input for adjusting the control system,
- a patient carrier moveable between several scan-positions,
- a surveyor unit for measuring the position of the patient carrier in said scan positions,
- a comparator for generating a deviation signal which represents a difference between the measured position of the patient carrier and a reference value,
- the signal output of the comparator being coupled to the adjustment input of the control system.

9. A magnetic resonance imaging system as claimed in Claim 8, wherein
- the surveyor unit includes a position memory in which a measured position of a preceding scan position is stored and
- said stored preceding scan position is employed as the reference value.

10. A magnetic resonance imaging system arranged to
- employ an explorative scan so as to acquire explorative magnetic resonance signals from an object
- derive a regulation signal from the explorative scan,
  - the regulation signal representing temporal variations of contrast in the object
- acquire data sets of magnetic resonance signals from respective scan-volumes of the object, wherein
- the acquisition of the data sets is started on the basis of a comparison of the regulation signal with a preselected contrast.

11. A computer program comprising instructions for
- employing an explorative scan so as to acquire explorative magnetic resonance signals from an object
- derive a regulation signal from the explorative scan,
  - the regulation signal representing temporal variations of contrast in the object
- acquiring data sets of magnetic resonance signals from respective scan-volumes of the object, wherein
- the acquisition of the data sets is started on the basis of a comparison of the regulation signal with a preselected contrast.

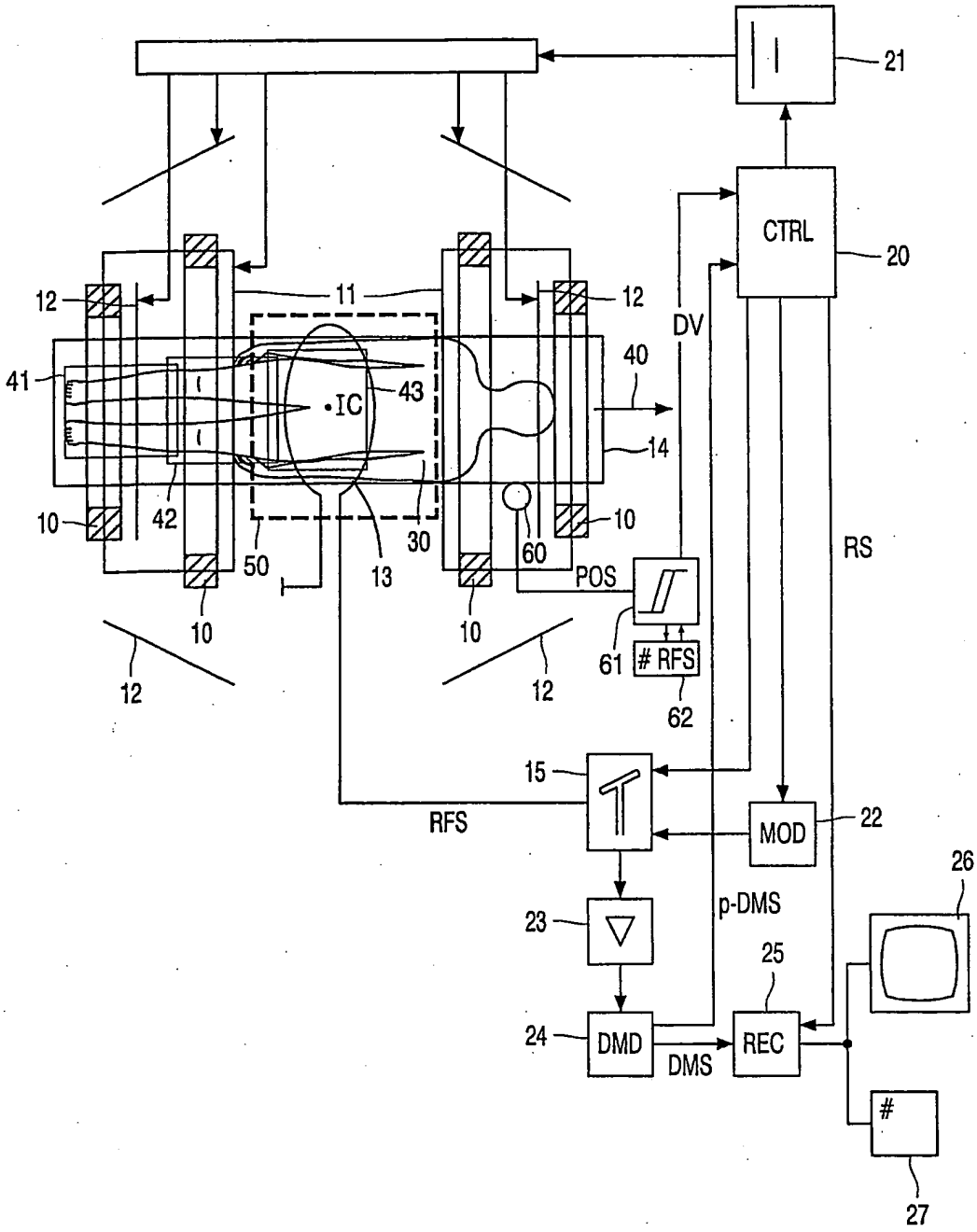
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FIG. 1

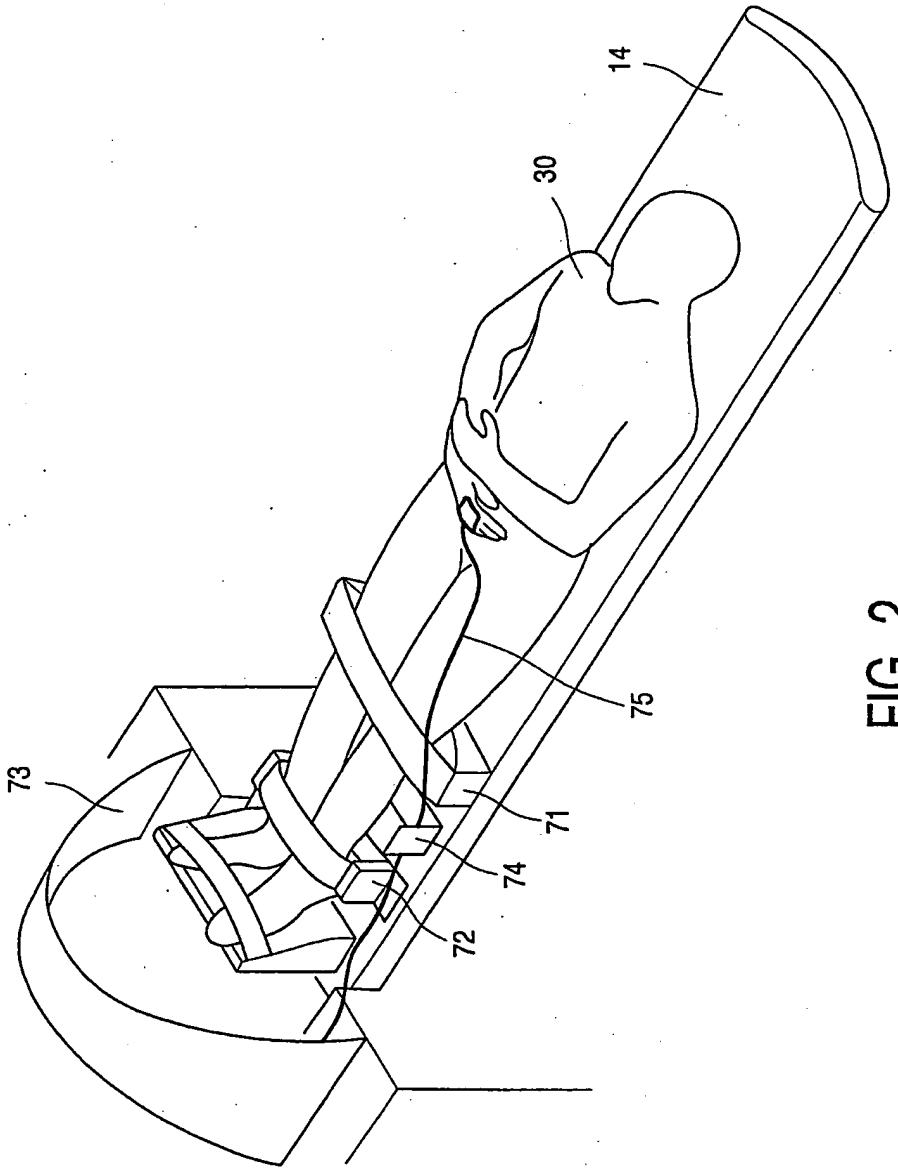

FIG. 2

INTERNATIONAL SEARCH REPORT

Inte[illegible]al Ap[illegible]n No
PC1/EP 01[illegible]247

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G01R33/28

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G01R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 924 987 A (MEANEY JAMES F M ET AL) 20 July 1999 (1999-07-20) column 7, line 50 -column 12, line 22 column 20, line 30 -column 21, line 18 column 22, line 44 -column 25, line 34 column 26, line 27 -column 29, line 25 column 31, line 45 -column 32, line 12; figures 2,5 --- -/--	1-11

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
15 October 2001	26/10/2001

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INTERNATIONAL SEARCH REPORT

Information on patent family members

Inte al Application No
PCT/EP 01/07247

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